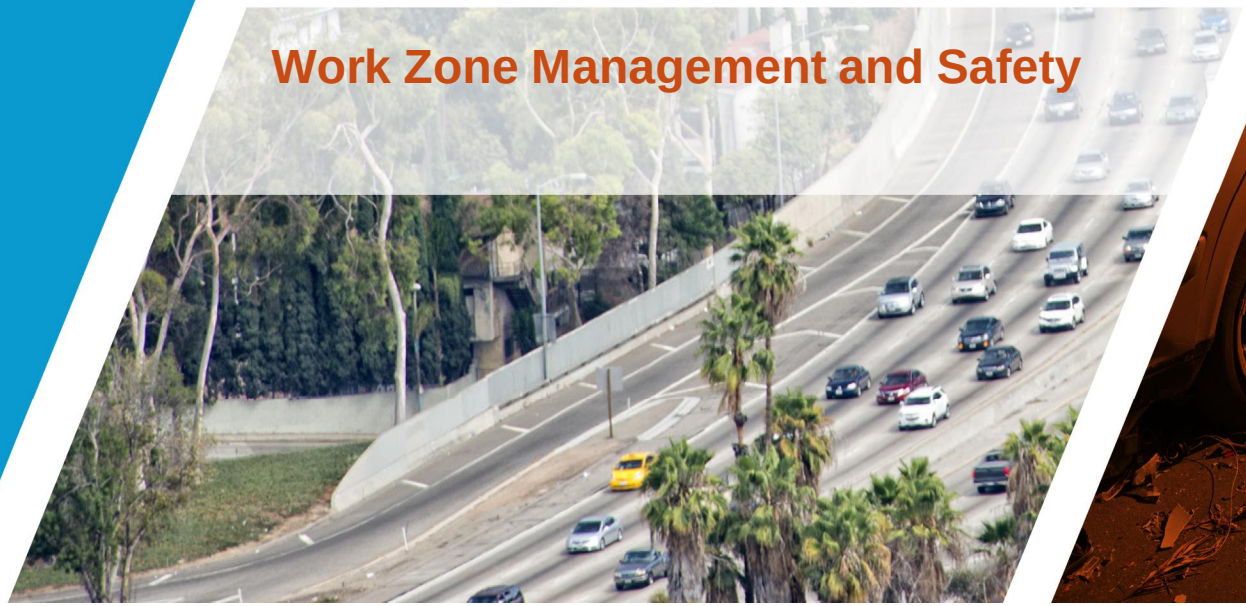
CALTRANS REGIONAL OPERATIONS FORUMS

Work Zone Management and Safety



What Are Some Challenges You Experience With Work Zones?

- How do work zones affect operation of the transportation system?

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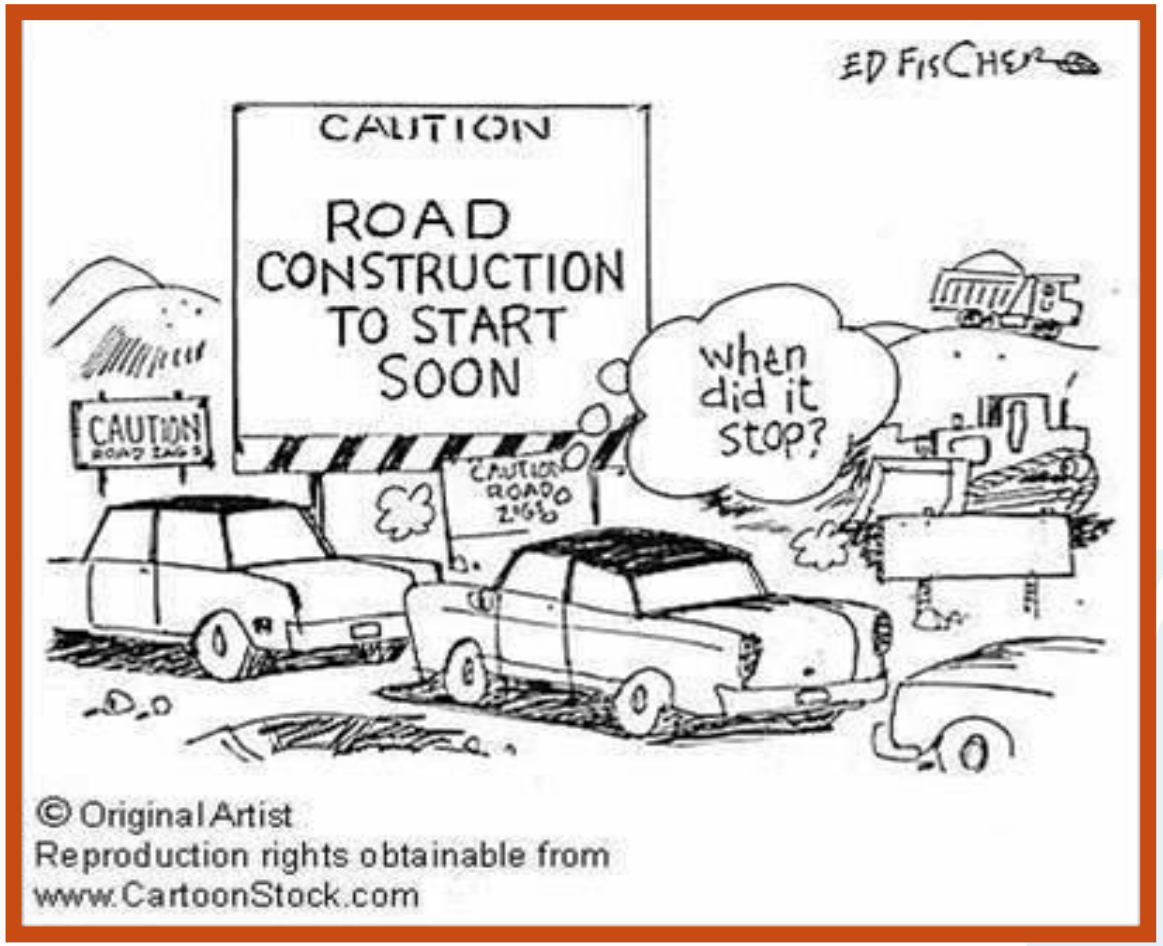
Work Zone Challenges

- Worker & road user safety
- Work zone congestion & delay
  - ↳ Major source of delay for rural areas
- Roadway capacity & speed reductions
- Alternate routing & travel route availability
- Lack of coordination
- Day & night time condition awareness/visibility
- Traffic pattern changes
- Traffic incident management

Traveler Perceptions



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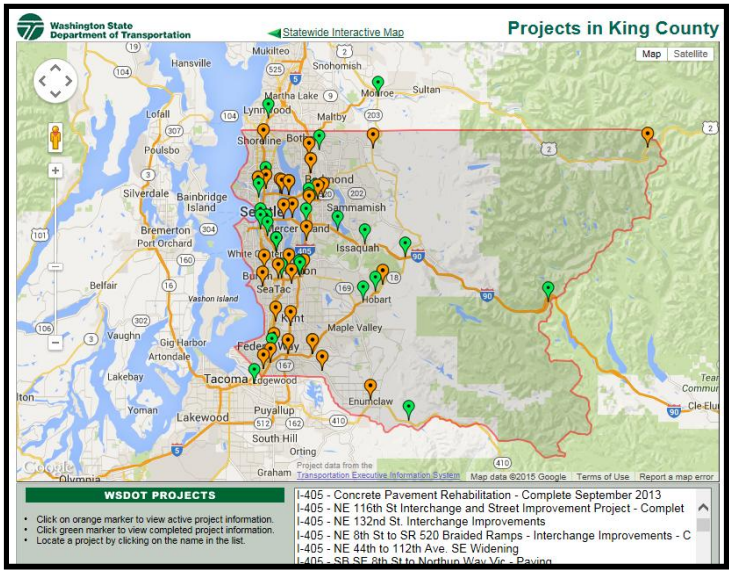
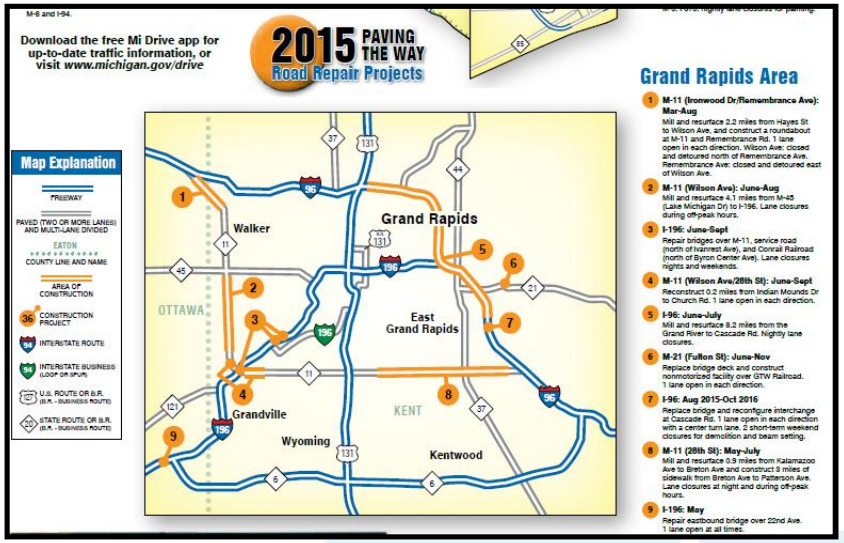
How Travelers Experience Work Zones

DELAY

OUT THERE
"FOREVER"





CONFUSING

THEY'RE
EVERYWHERE

CONGESTION

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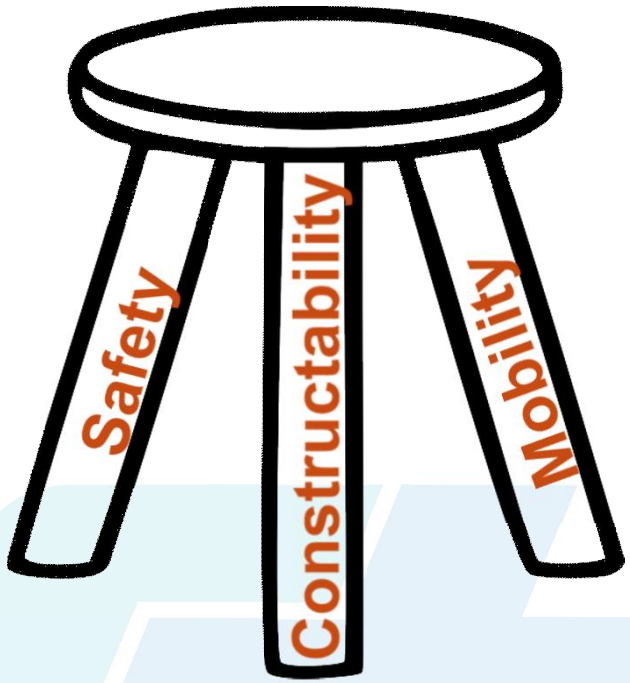
Work Zone Management

- Need to balance:
  - Safety
  - Mobility
  - Constructability



Objective:

Achieve constructability without compromising safety and mobility

Federal Requirements Affecting Work Zones

- Manual on Uniform Traffic Control Devices (MUTCD) – Part 6
- Work Zone Safety and Mobility Rule (Subpart J)
- Temporary Traffic Control Devices Rule (Subpart K)
- **What else?**
- **Are you familiar with these requirements?**

Work Zone Safety and Mobility Final Rule

- Effective date - October 2007
- Improve work zone safety and mobility
  - Reduce/manage impacts
- Better plan for, design, and implement work zones
  - Early involvement of key stakeholders
- Promote good work zone traffic management
- Provide some flexibility to address:
  - States, regions, agencies
  - Project impacts
  - Stakeholder concerns

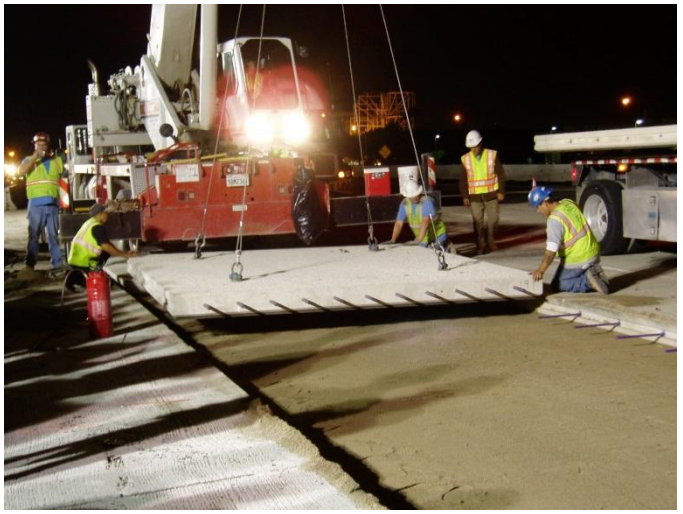
Project and Its Impacts

- Type of Work
- Duration
- Facility Type
  - ↳ Bridge, Arterial, Highway, etc.
- Level of Expected Impacts
  - ↳ Traffic, Access, Other

What are other considerations?

Other Considerations

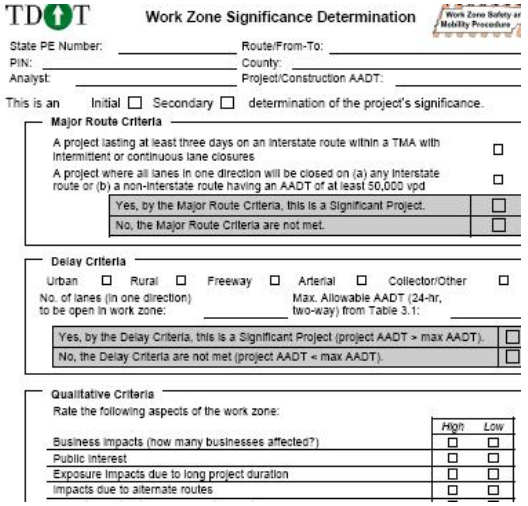
- **Stakeholder Needs**
  - Special events
  - Seasonal traffic
- **Constraints**
  - Budget
  - Alternate routes
  - Other work zones
  - Political sensitivities



What else?

Assessing Work Zone Impacts

- Identify impacts
  - Consider various stakeholders
- Tools
  - Lane closure spreadsheets
  - Templates/checklists
  - Modeling
- Determine level of impacts
  - Acceptable?
- Mitigate impacts accordingly



TDOT Work Zone Significance Determination

State PE Number: _____ Route/From-To: _____
PIN: _____ County: _____
Analyst: _____ Project/Construction AADT: _____

This is an Initial ☐ Secondary ☐ determination of the project's significance.

Major Route Criteria

A project lasting at least three days on an interstate route within a TMA with intermittent or continuous lane closures ☐
A project where all lanes in one direction will be closed on (a) any Interstate route or (b) a non-Interstate route having an AADT of at least 50,000 vpd ☐

Yes, by the Major Route Criteria, this is a Significant Project.	☐
No, the Major Route Criteria are not met.	☐

Delay Criteria

Urban ☐ Rural ☐ Freeway ☐ Arterial ☐ Collector/Other ☐

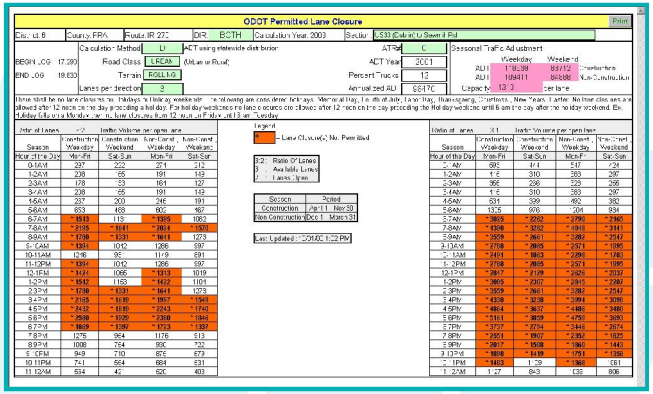
No. of lanes (in one direction) to be open in work zone: _____ Max. Allowable AADT (24-hr, two-way) from Table 3.1: _____

Yes, by the Delay Criteria, this is a Significant Project (project AADT > max AADT).	☐
No, the Delay Criteria are not met (project AADT < max AADT).	☐

Qualitative Criteria

Rate the following aspects of the work zone:

	High	Low
Business impacts (how many businesses affected?)	☐	☐
Public interest	☐	☐
Exposure impacts due to long project duration	☐	☐
Impacts due to alternate routes	☐	☐



ODOT Permitted Lane Closure

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What is a TMP?

- Transportation/Traffic Management Plan (TMP)
- Design documents show how a project will be built
  - TMP shows how traffic will be managed during construction
- Required on ALL Federal-aid projects
- Scalable to the project
- Considered a living document
  - Start early and update as needed
  - Monitor during construction and adjust if needed

Why TMPs? – Key Benefits

- A well-planned method for managing traffic flow during construction can:
  - Promote efficient construction phasing/staging, minimize contract duration and control costs
  - Maintain safety for workers and road users
  - Minimize traffic and mobility impacts
  - Minimize impacts to local communities/businesses
  - Address impacts at corridor and network levels

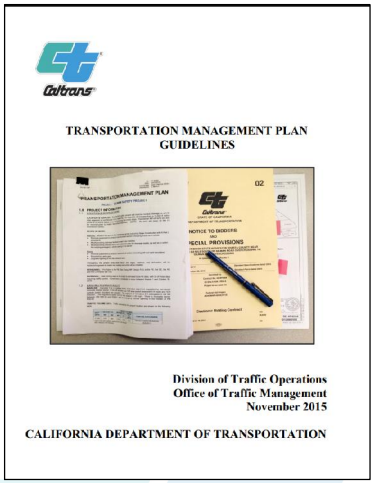
Components of a TMP

- Three main components
  - Temporary Traffic Control Plan (TTCP)
  - Transportation Operations (TO) strategies
  - Public Information and Outreach (PI) strategies
- Significant Projects = All 3 components required
- Other projects = TTCP required
  - TO and PI considered as appropriate

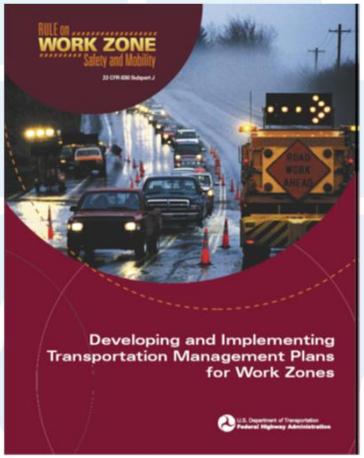
What's Your Process for TMP Development?

- Who's involved?
- When does it start?
- Does it work well?

Caltrans TMP Guidelines



FHWA TMP Guide:
Developing and Implementing TMPs for Work Zones



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TMP Development in Caltrans

- Begins during project initiation and planning
- Responsibility of 3 individuals
  - District traffic manager (DTM)
  - TMP manager
  - Construction traffic manager
- 3 levels - factors
  - Project characteristics
  - Projected delay

LEVEL OF TMP	TYPES OF CONDITIONS	TYPES OF STRATEGIES
"Blanket" TMP	• No expected delays • Off-peak work • Low volume roads • Moving lane closures	• Portable changeable message sign (CMS) • Freeway service patrol (FSP) • Traffic management team (TMT) • Only working in off-peak hours
"Minor" TMP (Majority of TMPs fall into this category)	• Minimal impacts expected • Lane closure required for project • Some mitigation measures required for project	• Only working at night • Portable and fixed CMS • Construction Zone Enhanced Enforcement Program (COZEEP) or MAZEEP for maintenance activities • TMT • Highway advisory radio
"Major" TMP (~5% of TMPs are major)	• Significant impacts expected • Multi-jurisdictional in scope • Longer duration • Multiple contracts involved	Same as for Minor TMPs plus: • Public awareness campaigns • Extended closures to expedite work • Moveable barriers to reverse lanes during peak periods • Detours • Reduced lane widths • Website

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WZ Management Strategies

- Contract incentives
- Accelerated construction
- Off-peak/night work
- Narrowed lanes
- Ramp and road closures
- Contraflow lanes
- Traffic control
- Enhanced enforcement
- Freeway service patrol
- Demand management
- Traveler information
- ITS
- Signal timing adjustments
- ...and many more

Which of these strategies affect TSMO?

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Design and Contracting

- Design decisions and WZ operations
- Contracting decisions and WZ operations
- ***Do you interact with Design and Contracting?***
- ***Is WZ traffic management considered?***

Construction Approaches - examples

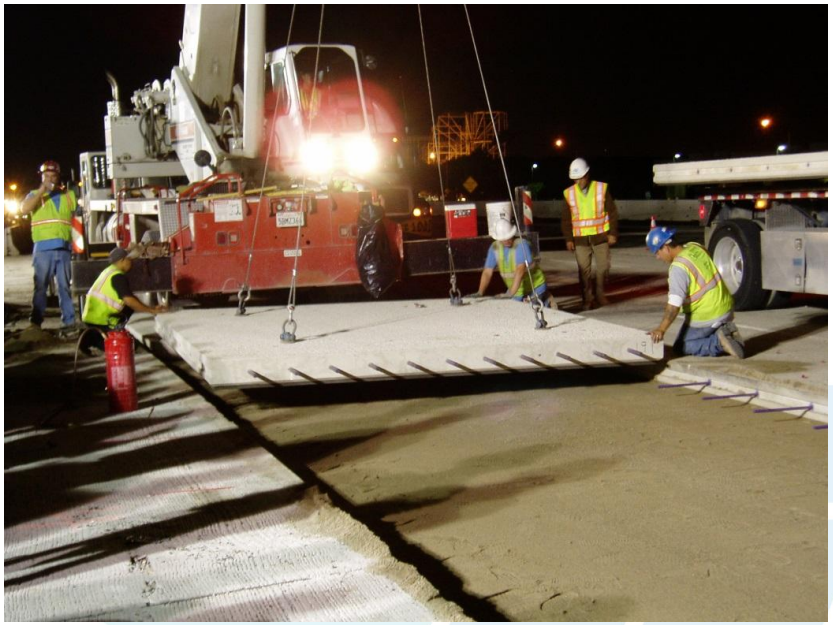
- Basic approach to building the job
  - Part-width construction
    - Short term lane closures
    - Long-term lane closures
    - Night work vs peak vs off-peak
  - Close 1 side, crossover, run opposing traffic on 1 side
  - Full closure
- **How does the choice of construction approach affect TSMO?**

Columbus/I-670: Increased space for equipment, material

I-84/Portland: Crews work without interruption

Accelerating Projects - examples

- ***Getting the work done sooner reduces impacts***
  - Construction using pre-fab components
  - Contracts that include incentives to finish earlier
  - Design-Build



Work Zone ITS - applications

- Traffic management systems
  - Traditional traffic management
    - Monitoring
    - Signals
    - Ramp metering
  - Dynamic merge systems
  - Variable speed limit/Active traffic management (ATM) systems
  - Queue warning systems
- Traveler information systems
- Incident management systems
- Intrusion alarm systems
- Automated speed enforcement/feedback systems

Dynamic Merge Systems

- Dynamic signs and devices control vehicle merging approaching lane closures
- Changes lane use instructions based on current traffic conditions
- Sensors determine congestion level or queue length
- “Early” and “Late”

Dynamic Late Merge

1.5 miles from Taper

At Taper

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Variable Speed Limit (VSL)

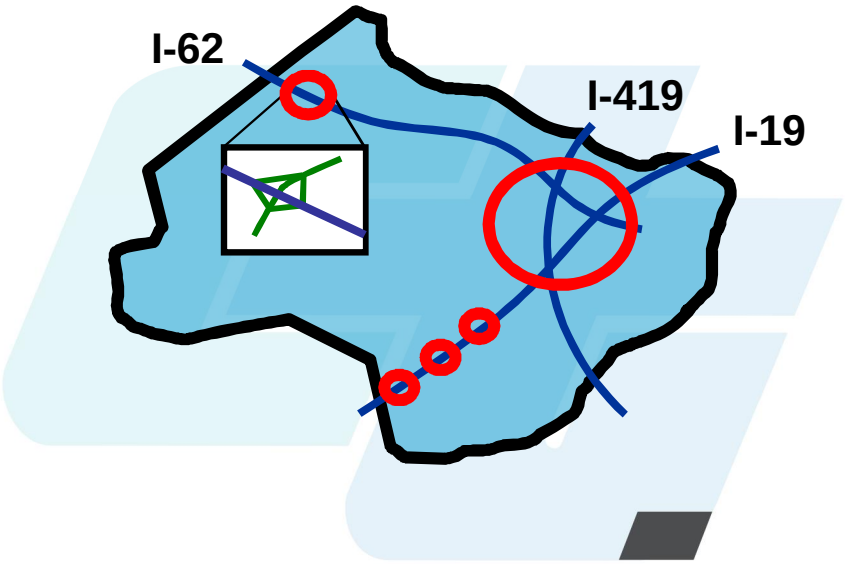
- Provides ability to set speed limit based on work zone conditions
  - Type of work being done
  - Characteristics of work zone
  - Weather
- Improved driver compliance with posted speeds on VSL

Queue Warning Systems

- **Goals**
  - Reduce risk of crashes
  - Inform public about delays and help with options to minimize delays
- **Functions**
  - Detect speeds
  - Warn drivers of slowed/stopped traffic ahead
  - Provide anticipated delay at decision points before WZ
- **Equipment**
  - Sensors
  - Portable message boards

Corridor Construction Impacts – Group Discussion

- What challenges do you face on coordinating nearby construction projects?
- How have you responded to these challenges?
  - ↳What has worked well?
  - ↳What hasn't worked so well?



Safety in Operations

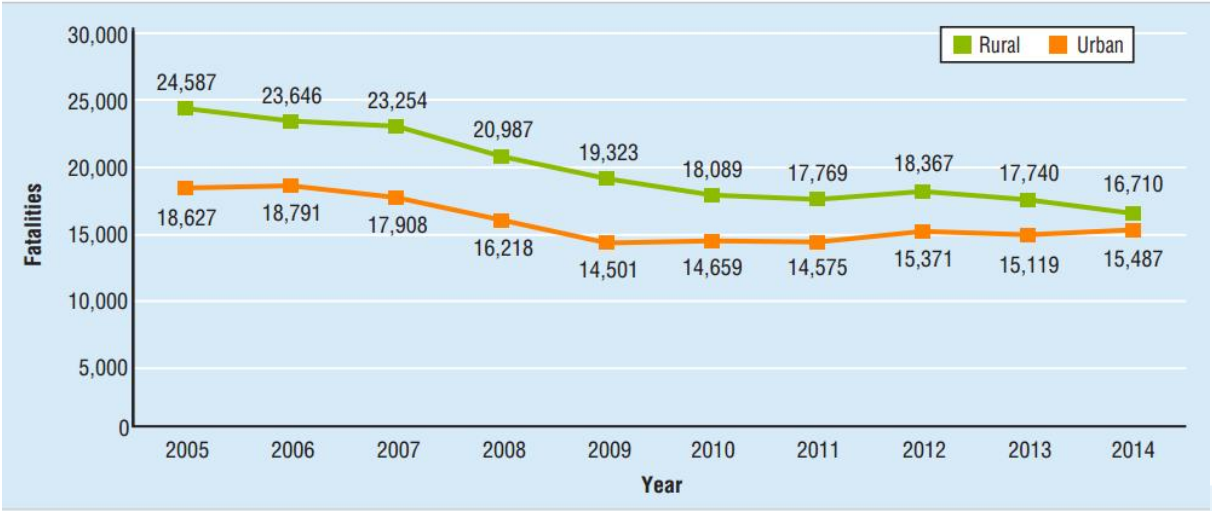
Why Link Safety and Operations?

- Highway fatalities and serious injuries at unacceptable levels

- 37,000 traffic fatalities in 2016
  - Largest increase in traffic deaths in 50 years
  - Boeing 747-400 carries 520 passengers
  - 2016 traffic fatalities = 71 airline crashes

Rural and Urban Safety

- Nationally –
  - 50% of traffic fatalities occur in rural areas
- Factors
  - Time of day
  - Speed
  - Alcohol
  - Restraint use



Source: NHTSA July 2016

- California
  - 38% of traffic fatalities occur in rural areas
  - What are the primary factors you see?

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Safety Issues in District 1

- What are the top safety issues you see on the road network?

- What measures have already been taken to address safety needs?

Safety Measures and TSMO

- Safety is addressed through many different measures
  - Lighting
  - Signs
  - Road/pavement marking
  - Signals
  - Advanced warning of hazards
  - Weather response
  - Physical barriers
- TSMO focuses on
  - Processes to improve safety planning and strategy
  - Root cause analysis
  - Collaborative options



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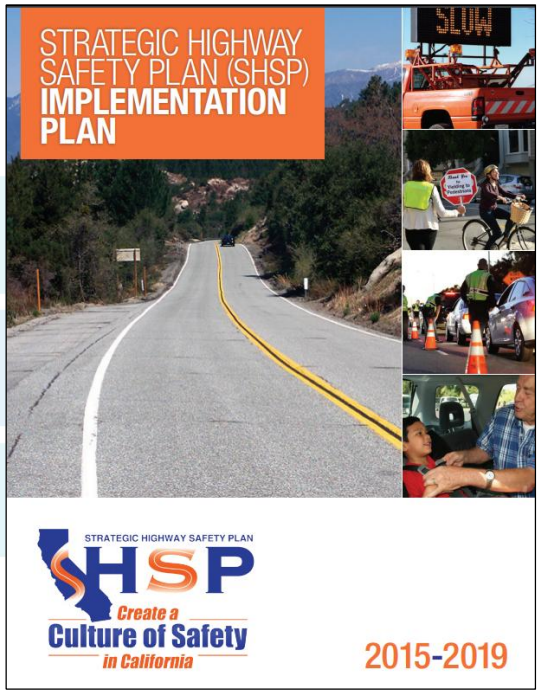
For example…

- Data from ITS and operations systems can help to support safety analyses
  - ↳ Performance tracking
- Evaluate safety needs as part of operations design and implementation
- Leverage Strategic Highway Safety Plan implementation
  - ↳ Local/regional stakeholders
  - ↳ Address common safety concerns
- Outreach and education



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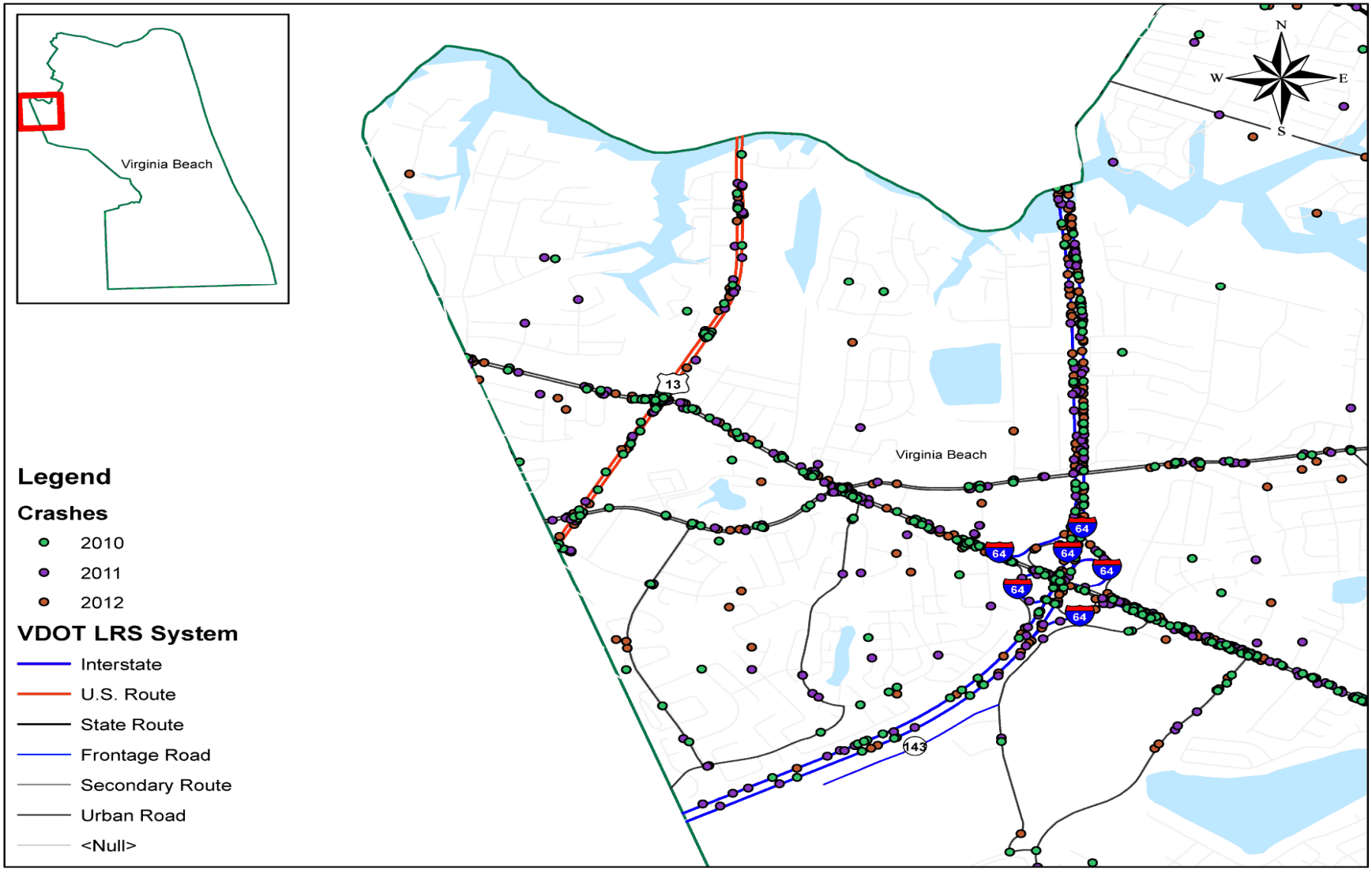
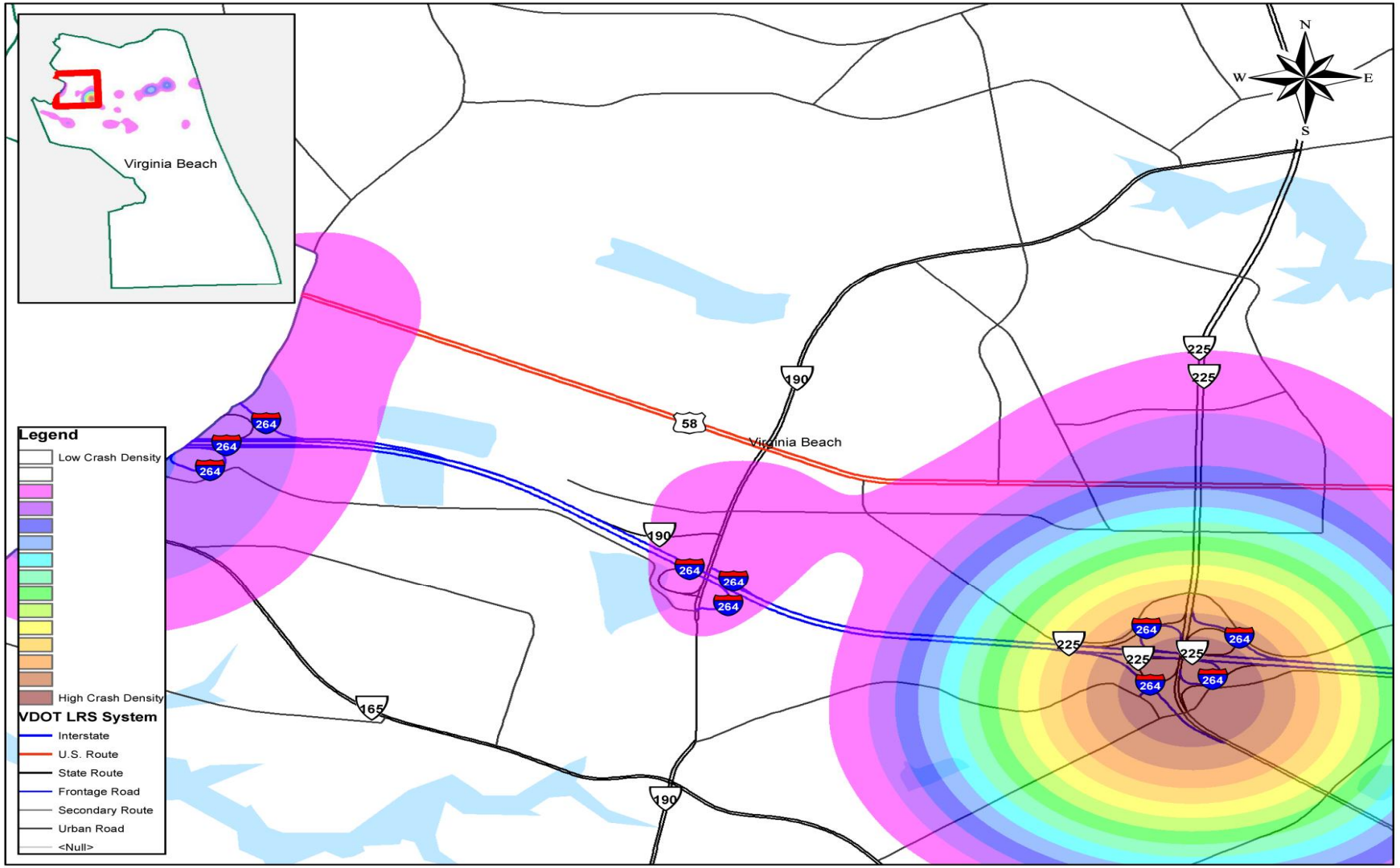
Current Methods for Tracking and Reporting Safety Issues

- How do agencies in D1 currently track crashes and crash characteristics?
  - Locations
  - Severity
  - Location frequency

Crash Locations through GIS



Crash Density Maps



Work Zone Resources

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Key Work Zone Resources

- Work Zone Safety and Mobility Final Rule
  http://www.ops.fhwa.dot.gov/wz/resources/final_rule/language.htm
- Developing and Implementing Transportation Management Plans for Work Zones
  http://www.ops.fhwa.dot.gov/wz/resources/publications/trans_mgmt_plans/trans_mgmt_plans.pdf
  - TMP training online course
    http://www.ops.fhwa.dot.gov/wz/resources/final_rule/tmp_examples/tmp_dev_resources.htm
- FHWA Work Zone Website http://www.ops.fhwa.dot.gov/wz/index.asp
- National Work Zone Safely Information Clearinghouse:
  http://www.workzonesafety.org
- Work Zone Best Practices Guidebook
  http://www.ops.fhwa.dot.gov/wz/practices/best/bestpractices.htm

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Additional Work Zone Resources

- FHWA Work Zone ITS Implementation Guide
  http://www.ops.fhwa.dot.gov/publications/fhwahop14008/fhwahop14008.pdf
- AASHTO ITS in Work Zones
  http://stsmo.transportation.org/Pages/its.aspx
- ITS Safety and Mobility Solutions: Improving Travel Through America's Work Zones
  http://www.atssa.com/galleries/default-file/2008July21_ITS_Safety_and_Mobility.pdf
- Caltrans Work Zone Traffic Control Resources
  http://www.dot.ca.gov/trafficops/tcd/workzones.html
- NCHRP Synthesis 379: Selection and Evaluation of Alternative Contracting Methods to Accelerate Project Completion
  http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_379.pdf

EDC3: Smarter Work Zones

Innovative strategies designed to optimize work zone safety and mobility

- **Project Coordination**

Coordination within a single project and/or among multiple projects within a corridor, network, or region, and possibly across agency jurisdictions to minimize work zone traffic impacts.

- **Technology Application**

Deployment of Intelligent Transportation Systems (ITS) for dynamic management of work zone traffic impacts, such as queue and speed management.

http://www.workzonesafety.org/SWZ - webinars, case studies, and more